



## Is Biodentine™ a suitable alternative to Mineral Trioxide Aggregate (MTA) for pulp therapy?

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### Introduction

The aim of pulp therapy is to maintain the integrity and health of the teeth, both primary and permanent, and their supporting tissues, and the treatment objective is to maintain the vitality of the pulp of a tooth affected by caries, traumatic injury, or other causes. Clinically, when considering the pulp pathology of primary and young permanent teeth, it is often difficult to determine the degree of inflammation. Furthermore, it is also challenging to differentiate between partial or total chronic inflammation of the pulp, and to choose the appropriate pulp treatment (Dummer et al., 1980). Although, it is common practice to decide on the type of pulp treatment for primary teeth based upon the diagnosis, following clinical and radiographic examinations, and patient evaluation, all too often, the outcomes depend on the medicaments used.

Formocresol, first introduced in 1904, has been hailed as the 'gold standard' of pulpotomy medicaments (Buckley, 1904) with a reported success rate to range from 84% to 100% (Fuks, 2008). However, in 2004, the International Agency for Research on Cancer (IARC) classified formaldehyde as carcinogenic for humans (International Agency for Research on Cancer, 2004). Since then, some countries have abandoned the use of formocresol over safety concerns despite persuasive evidence illustrating the safety of judiciously using formocresol for pulpotomy procedures

(Milnes, 2007). Nevertheless, this has led to a search for a suitable alternative to formocresol which has seen many different preparations including calcium hydroxide, ferric sulphate, sodium hypochlorite, and a new class of pulpotomy medicaments called hydraulic silicate cements (Darvell & Wu, 2011) and the use of electrosurgery and lasers.

Hydraulic silicate cements, unlike the dental silicate cements, require water for the setting reaction. Mineral trioxide aggregate (MTA) is an example of hydraulic cements. MTA was first introduced by Lee et al in 1993 as a root end filling material (Lee et al., 1993). Since then, MTA has been reported to be bacteriocidal, stimulates hard tissue formation, osteoblastic adherence and cementum-like hard tissue formation (Schmitt et al., 2001, Ford et al., 1996). However, MTA displays significant limitations in setting time, discolouration of the tooth and difficult handling properties (Torabinejad et al., 1995). In light of these shortcomings, a new calcium silicate based restorative material called Biodentine™, manufactured by Septodont™ is being marketed not only as an endodontic repair material but also as a pulpotomy medicament and claimed to be an 'ultimate dentine replacement' (Saint Maur de Fosse's, France) material. Nevertheless, in the current era of evidence based dentistry it is essential that any clinical material

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by Sue Cartwright,  
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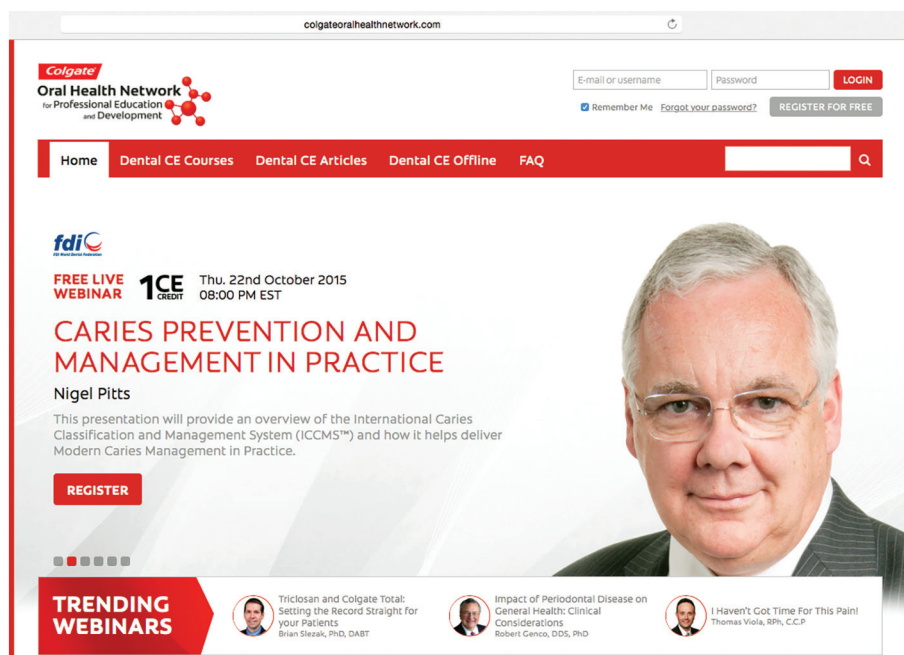
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should possess sound evidence to support its efficacy and safety. Therefore, it is purposed to review the evidence for the use of MTA and Biodentine™ for endodontic therapy in children.

## Direct pulp capping in primary teeth

Direct pulp capping involves the application of a medicament, dressing, or dental material to the exposed pulp in an attempt to preserve its vitality. The rationale behind this treatment is to encourage the pulp to initiate reparative/tertiary dentine formation at the exposure site. The success rate of this treatment is not particularly high in primary teeth and it therefore has limited application in this field (Kopel, 1992, Fuks, 2000, Rodd et al., 2006).

A case report and a number of cohort studies were identified in the literature relating to the use of MTA as a direct pulp capping material in primary teeth (Bodem et al., 2004, Caicedo et al., 2006, Tuna & Olmez, 2008, Shayegan et al., 2009, Leites et al., 2011, Shayegan et al., 2012, Kotsanos et al., 2014). Two of these studies have compared MTA with calcium hydroxide and reported that MTA has a similar response to calcium hydroxide in bovine primary teeth as a direct pulp capping material (Shayegan et al., 2009, Leites et al., 2011). Tuna & Olmez evaluated the efficacy of MTA compared to calcium hydroxide in children aged 5 to 8 years and found that at 24 months, none of the MTA and calcium hydroxide groups exhibited clinical or radiographic failures (Tuna & Olmez, 2008). Furthermore, another study used bovine teeth to compare MTA and Biodentine™ as direct pulp capping material and found that they exhibited similar efficacy after 90 days (Shayegan et al., 2012).

Therefore, due to the lack of long term, good quality research in this area of pulp therapy, it is logical to summarise that there is insufficient evidence for the support of direct pulp capping with MTA in primary teeth.

## Pulpotomy medicament in primary teeth

A randomised prospective controlled clinical trial carried out in 2008 compared primary molars pulpotomised with either formocresol, ferric sulphate, calcium hydroxide or MTA over a period of 2 years and found that there was no statistically significant difference between the groups

(Sonmez et al., 2008). The overall success rates for MTA as a pulpotomy medicament in primary molar teeth ranges from 94% to 100%. These figures are based on meta analyses (Peng et al., 2006) and an evidence-based assessments (Ng & Messer, 2008). Additionally, the most recent systematic review and network meta-analyses found that MTA is the first choice for primary molar pulpotomies. However, it also recommended that if treatment cost is an issue, especially when the treated primary molars are going to be replaced by permanent teeth, ferric sulfate may be the material of choice (Lin et al., 2014). This sentiment is echoed by the recent Cochrane review on pulpotomies in primary molars (Elkhadem & Sami, 2014).

Conversely, a systematic review on MTA pulpotomies in primary teeth assessed 22 studies and concluded that the quality of the data presented was poor and therefore did not provide sufficient evidence about the efficacy of MTA as a pulpotomy medicament in primary teeth (Anthonappa et al., 2013). A recent double blind randomised controlled trial (Rajasekharan et al., 2014) evaluated the efficacy of MTA and Biodentine™ as pulpotomy medicaments in primary molars and reported no significant differences in the success rates after a 12 month follow-up period.

Based on the Cochrane review there is no one superior pulpotomy medicament. The cost of MTA may preclude its clinical use. Nevertheless, there is a need for meticulous implementation and reporting of well-designed clinical trials with standardized, comparable and patient-centered long-term outcomes prior to making definitive recommendations.

## Young permanent teeth

The aim of pulp therapy in traumatised or cariously exposed young permanent teeth is to maintain pulp viability by eliminating bacteria from the dentin-pulp complex and to establish an environment in which apexogenesis can occur. The ability of the clinician to manage the health of the remaining pulpal tissue during the procedure is paramount (Witherspoon, 2008). Nevertheless, a complicating factor in treating immature teeth is the difficulty predicting the degree of pulpal damage.

Farsi and co-workers, assessed 30 asymptomatic permanent molars with pulp exposures treated with MTA and found that after 24 months, the clinical and radiographic success rates were 93% with evidence of continued root development

(Farsi et al., 2006). Furthermore, a large practice-based randomised clinical trial concluded that MTA exhibited superior performance as a pulpotomy medicament in permanent teeth when compared to calcium hydroxide (Hilton et al., 2013).

A case series by Martens and his co-workers in 2014 illustrated that Biodentine™ exhibited a favourable outcome when used as a pulp capping and pulpotomy medicament in the first permanent molars. Similarly, they demonstrated sustaining the vitality and facilitating apexogenesis following a pulpotomy with Biodentine™ in an immature traumatized central incisor during a follow-up period of 3-years. Furthermore, favourable outcomes were achieved in two other cases with infection after trauma (Martens et al., 2014). In addition, a histological study of 26 caries-free permanent molars treated with MTA and Biodentine™, the authors concluded that within the limitations of this study, Biodentine™ exhibited a similar efficacy in a clinical setting and may be considered an interesting alternative to MTA in pulp-capping treatment during vital pulp therapy (Nowicka et al., 2013).

Although Biodentine™ appears to exhibit a great potential to deliver favourable outcomes in immature permanent teeth compared to calcium hydroxide, and similar efficacy to MTA, there is insufficient scientific evidence to support the superiority of one medicament over the other.

## Toxicity

MTA has a number of limitations such as, difficult handling characteristics, discoloration of the tooth, difficult to remove after it has set, high cost and the presence of toxic constituents. These toxic constituents may include albeit in minimal concentrations, arsenic which is known to be carcinogenic (De-Deus et al., 2009, Mandal & Suzuki, 2002). Currently, the toxicity of MTA is controversial because a debatable experimental methodology (Monteiro Bramante et al., 2008) claimed that MTA-Obtura, white MTA-Angelus, and white portland cement exhibit arsenic levels below the limit set by ISO 9917-1 (2007), while another study (Schembri et al., 2010) demonstrated that MTA and portland cement contained levels of arsenic higher than the safe limit specified by ISO 9917-1 (2007). Therefore, evidence regarding MTA toxicity is unclear.

## Conclusion



Both, MTA and Biodentine™ appear to demonstrate similar efficacies when used for pulp therapy in primary and young immature permanent teeth. However, currently there is insufficient evidence to support the superiority of one material over the other. Nevertheless, given the lower cost of Biodentine™, it could be considered as a cost effective alternative to MTA.

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Table 1. Overview of the major differences between Mineral Trioxide Aggregate (MTA) and Biodentine™

|                                       | Mineral Trioxide Aggregate              | Biodentine™                          |
|---------------------------------------|---|--------------------------------------|
| Main difference in composition        | Naturally occurring tricalcium silicate | Purely synthetic tricalcium silicate |
| Radiopacifier                         | bismuth oxide                           | zirconium oxide                      |
| Setting time (minutes)                | 165 – 320                               | 12                                   |
| Discolouration                        | Yes                                     | No                                   |
| Compressive strength (MPa) at 28 days | 78.92                                   | 304.78                               |
| Cost (single use)                     | AUS\$60                                 | AUS\$14                              |





## Federal President's Report

*John Sheahan*

The 2015 ANZSPD Biennial Conference in Adelaide is fast approaching...

As the hosts of our next federal scientific meeting, the South Australian Branch under the leadership of Branch President, Dr Michael Malandris, has been hard at work to ensure delegates' appetites for a stimulating and enriching learning opportunity in comfortable surrounds, and for a fun and friendly social programme are satiated. To be successful, events such as this demand a huge amount of work by the organising committee. I am delighted to report that the Branch has already put in the hard yards and that the road to Adelaide promises to be a smooth, downhill run from here. To be successful, the Biennial also needs the support of our corporate partners. Once again, they have not let us down with the accompanying trade exhibition a highlight of the meeting. Dr Sam Gue has relished his responsibility for arranging the guest speakers who will challenge our preconceptions on a broad range of topics related to paediatric dentistry. ANZSPD will welcome Professor Helen Rodd as the Colgate Keynote Speaker. Having heard Helen speak at several international meetings, I know her return to Adelaide and her lectures will be warmly received. The 2015 Colgate ANZSPD Research Award will be hotly contested, there being a record number of entries accepted for this prestigious prize. All of this will be supported by the best academics and clinicians from across Australia and New Zealand. Don't miss out. If you haven't already registered, do so quickly! (<http://www.anzspd2015.com.au>)

I am delighted to announce that, at the time of writing, ANZSPD has received in principle agreement from Colgate to extend its contract with ANZSPD for a further 5 year period. A revised contract has been successfully negotiated and I trust that, by the time of publication, both parties will have signed it and swapped copies. I am deeply indebted to Dr Susan Cartwright, the Scientific Affairs Manager at Colgate Oral Care, for facilitating the negotiations. ANZSPD is proud of its long-standing close relationship with Colgate. It is mutually beneficial

to both organisations and the symbiotic relationship between them is wonderful for the oral health of the infants, children and adolescents of Australia and New Zealand. Long may Colgate continue to be our Principal Sponsor!

By now, Members should be aware of the passing of Dr Grace Suckling, an Honorary Member of ANZSPD (New Zealand Branch). Grace's research into developmental defects of enamel (DDE) led the world. I had the honour of meeting Grace at the Annual Study Day of the New Zealand Branch which was held in Wellington in November, 2014. Despite being in her nineties, I found Grace to be a vivacious and charismatic individual who exuded a wonderful joie de vie. She was humble that she had made such an outstanding contribution to dental science and gracious when receiving the praise that was her due. ANZSPD mourns the loss of its esteemed member.

The primary objective of my agenda while Federal President has been to raise awareness of issues affecting the successful provision of high quality oral health care to the infants, children and adolescents of Australia and New Zealand. Ensuring that ANZSPD's views were expressed in submissions to relevant organisations was the most important way in which this has been achieved during my term in office. Those of you who have known me professionally for any length of time, will be aware that one of my major concerns is the ever-reducing access dentists have to operating theatres for the dental restorative care of patients under general anaesthesia. Typical of the submissions that ANZSPD has prepared is the submission ANZSPD wrote for delegates attending the Australian Dental Association (ADA) Affiliates Meeting held in Sydney on 20th May, 2015. This submission which was emailed to the ADA follows (Appendix A). Among others, a copy of this submission was also sent to the Members of the Executive of the Australasian Academy of Paediatric Dentistry and to the three ANZSPD

Members who are on the Council of the Royal Australasian College of Dental Surgeons (RACDS). In time, these influential individuals may be in a position to use the information in the submission to raise ANZSPD's concerns in other relevant fora. This sort of information sharing with other relevant parties has been a feature of my presidency.

It is pleasing to report that while pursuing my primary objective, a secondary benefit has been an increasing profile for ANZSPD itself and for its opinions. No longer can Members complain that no-one is listening to the issues that concern ANZSPD because now the movers and shakers are actively coming to ANZSPD to ask its opinion on matters of policy. Clear evidence of this can be seen in the recent request by the ADA for ANZSPD's input prior to the ADA's attendance at a forum of key stakeholders to discuss the Review of the Medicare Benefits Schedule. This Schedule is not the same as the Child Dental Benefits Schedule but it is equally important for paediatric dental patients when the constraints of the family budget are a barrier to accessing dental care. I believe ANZSPD was the only Affiliate of the ADA which received this request. No doubt ANZSPD was asked only because it had a proven track record as a reliable source of feedback and being capable of responding within a tight timeline. The delegate representing the RACDS at a similar forum on the same topic also reported that she found ANZSPD's response to the ADA's request to be an important resource in preparing herself in advance of the forum she attended. It is my fervent hope that this level of engagement and influence will continue into the future.

I would like to thank all of those Members who have contributed to the establishment and maintenance of ANZSPD's revitalised website. In particular, I would like to thank Dr John Winters who has spearheaded efforts to raise ANZSPD's profile through this vital communication medium. I anticipate that

as time progresses, Members will continue to see the functionality of the website expand to its full potential. While it is already a fantastic resource for Members and the public, I'm sure the best of the website is yet to come!

Synopses remains a vital source of information for Members. Finding enough material to publish is a challenge that has dogged Editors for at least 10 years. It is with pleasure that I am able to state that this report is published in 2015's third issue of Synopses. Perhaps 2006 was the last time 3 issues were published in the one calendar year. This improved state of affairs has largely been the result of an idea suggested by the then Editor, Dr Tim Johnston. Each Branch is now responsible for generating enough material for one issue of Synopses every 2 years. Our current Editor, Dr Steve Kazoullis, has been proactive and he has advised all the Branches when their next issue is due for publication. If you are on the Branch Executive or responsible for the postgraduate paediatric dental training in your Branch's jurisdiction, expect to receive your deadline well in advance of the expected publication date. Now that Synopses has regained its momentum, I trust that Branches and all the dental schools will keep the ball rolling in the right direction by supporting the generation of suitable material.

I have also enjoyed great support for my agenda from all of Federal Councillors, the Branch Executives and the general membership of ANZSPD. In particular, I would like to thank all those who quietly offered me their wise counsel and encouragement, and all those who have made significant contributions to the submissions written by ANZSPD during my years at the helm. Because there are far too many of them, I will not name them individually. The individuals concerned will know it is to each of them that I address my thanks.

ANZSPD also continues to exert its influence at an international level. At last meeting of the Council of the International Association of Paediatric Dentistry (IAPD) which was held in July in Glasgow, ANZSPD's Member and nominee for the position, Professor Bernadette Drummond, was elected as one of the four Representatives of National Member Societies on the Board of Directors of IAPD. Her timely election ensured that ANZSPD's long history of continuous representation on the Board has not been interrupted by

the retirement of Dr Eduardo Alcaino from the Board following the end of his term as the Association's Immediate Past President. At the same meeting, ANZSPD also played a key role in shaping the future leadership of IAPD with ANZSPD's nominee for International President Elect, Dr Anna-Maria Vierrou from Greece, being endorsed by Council for the position. Moreover, at a more mundane level, having recently met Dr Robert Delarosa, the President of American Academy of Pediatric Dentistry at the Academy's Annual Session in Seattle, Rob was keen to pick my brains about the workings of the Council of IAPD before its meeting in Glasgow. Naturally, as this was his first Council meeting and my 4th Council meeting representing ANZSPD, I was happy to oblige.

Just as the 2015 ANZSPD Biennial Conference is fast approaching, so too is the end of my term as Federal President of ANZSPD. As many of you will remember, I have been Federal President since July, 2012. After such a long time in office, I am more than ready to pass on the baton to my successor who will be elected by the Federal Council from among its members at its meeting on 12th November, 2015. The newly elected Federal President will assume office on 15th November, 2015 during the Closing Ceremony of the Biennial Conference.

My election as Federal President was a humbling experience for me and carried with it a great deal of responsibility. At the time of my induction, I said that if I were able to achieve half as much as the previous incumbent during his term as Federal President, I would think that I had done a satisfactory job. I will leave it to others to decide if I have met my own criterion. In the meantime, I would like to thank Dr Karen Mekertichian, the Immediate Past Federal President of ANZSPD, for his years of service to ANZSPD, especially now as his retirement from Federal Council is imminent.

From a personal point of view, I have found being Federal President enormously time-consuming but richly rewarding. It has been a period of immense personal growth, and it has allowed me an opportunity to establish a broader network of collaboration within the dental community on both sides of the Tasman and further afield, and this has allowed me to be a more effective advocate for the oral health of the infants, children and adolescents of Australia and New Zealand. I sincerely thank the

Federal Councillors who showed faith in my ability when they elected me, and I trust that I have not let them down.

Anything that I have done during my term in office has only been achieved because I have had the support of the staff at my private practice, my immediate and extended family, and in particular the support of my wife, Gabe. Back in 1991 when I was asked if I would join the Committee of the Victorian Branch of ANZSPD, she said, "Go for it" and I have enjoyed the same level of support from her ever since. People have often been heard to say that "behind every man is a great woman". Well, nothing could be truer in my case. If the Society is grateful for my efforts, it should be even more grateful to her for her efforts behind the scenes. Together she and I have been like a swimming duck, with me appearing to glide effortlessly for ANZSPD above the water while she has been paddling frantically to support me below the surface. Without her efforts, my Presidency would have gone nowhere. To my staff, to my family in general and to Gabe in particular, I say "Thanks".

I cannot thank enough the current Federal Secretary/Manager, Dr Peter Gregory, for stepping into the breach when ANZSPD and I were feeling bereft after the loss of our dear friend and colleague, Dr Alistair Devlin. Peter originally agreed to take on the role for 12 months and subsequently agreed to continue in the role until November this year. During his time as Federal Secretary/Manager, Peter has worked tirelessly behind the scenes, methodically picking up the pieces and learning the ropes of his new and unfamiliar position without an experienced mentor to guide him. ANZSPD is indebted to him for his willingness to take on this role and for the aplomb with which he has executed his duties. I have to admit that I was a little hesitant when others put his name forward as a potential stand-in for Alistair. For years I have witnessed and admired Peter's highly developed leadership skills. I was left to wonder if he would be able to take direction from someone his junior. I need not have hesitated. Peter has proved his ability beyond measure. He has always been respectful of my position and sought my decision before acting on behalf of the Society. He has become a trusted confidant and I value his wisdom, his affirmation and his support for my agenda. I am sure ANZSPD joins with me in wishing him a well-earned rest after

his incredible contribution over the last few years.

In praising Peter, I do not wish to diminish the memory of Alistair. I am just as grateful to him for mentoring me. Any achievements during my presidency are also a reflection of his wonderful ability to guide and encourage, and of his comprehensive (and witty) responses to the avalanche of questions I sent to him during the first few months of my term in office.

As Federal Secretary/Manager for such a long period, Alistair knew more about the strengths, weaknesses and eccentricities of ANZSPD's Federal Presidents and Councillors than anyone else. He once confided that what he enjoyed most about being Federal Secretary/Manager for so long was the ability to see with a wide perspective the varying attributes each new Federal President brought to the position. In reflecting on this comment, I have come to realise that my successor will bring another new style of leadership

to ANZSPD, not a style which is better or worse than those who have gone before as Federal President, just different. Let's not try to compare apples and pears. Let's just enjoy both of them for what they are.

As I come to the end of my final Federal President's Report and as we approach the closing stages of 2015, let me take the opportunity to wish my successor well, and wish all the Members and friends of ANZSPD a joyful Festive Season and a safe, fulfilling and prosperous year in 2016.

## Appendix A

Dear Robert,

I would be most grateful if you would:

- *provide all of the delegates at tomorrow's ADA Affiliates meeting with a hard copy of this email*
- *add it to the meeting papers attached to the electronic version of the Agenda.*

As you know, the Agenda includes further discussion of "Dental Treatment under General Anaesthetic". This email should form part of that discussion.

I refer to the meeting paper which appears under item 2.2.1 in the Agenda for the ADA Affiliates Meeting (20/05/2015). This paper is entitled, "ANZSPD Submission to the ADA re Private Health Insurance Funds 21.02.2015.docx".

Item 10 of this meeting paper states:

**"10 Hospitals can generate income from Private Health Insurance Funds for medical procedures at a much higher per session rate than they can for dental procedures.** Why can hospitals generate refunds from the private health insurance funds at twice the per session rate for medical practitioners compared with dental specialists and general dental practitioners?"

Here is a quote from ANZSPD's letter to the ADA President in 2008: "It has been reported to us by a hospital representative that a dental procedure requiring 30 minutes in the operating theatre would attract a payment of \$813.00 from the largest fund. In contrast, a plastic surgical procedure requiring 30 minutes in the operating theatre would attract a payment of \$1200.00. The problem is magnified as the length of the procedure increases. For a two hour procedure, the hospital has reported it would receive \$813.00 for a dental procedure or \$4800.00 for a plastic surgical procedure. This absurd situation occurs because very few of the private hospitals offering admission for conservative dental procedures appear to have been able to negotiate sensible time-based, rather than procedure-based contracts with the major health funds. Needless to say, our health funds are quite happy for this situation to persist."

More recently (2011), another private hospital at which a large number of specialist dental practitioners have operating lists reported that the average income the hospital was able to generate per operating list for Paediatric Dentistry was \$2466. In comparison, the hospital's average income per operating list for:

*Podiatric (by a podiatrist) Surgery was \$3,127*  
*Oral Maxillofacial Surgery was \$3,431*  
*Plastic Surgery was \$3,760*  
*General Surgery was \$4,116*  
*ENT Surgery was \$4,288*  
*Ophthalmic Surgery was \$6,223"*

I now present the same hospital's figures for 2011 and for the last 2 financial years in Table 1. In Table 2, the change in the average income per operating list since 2011 for each type of surgery is also summarised. Due to the hospital's agreements with the private health insurance funds and the need for anonymity, this hospital will be referred to as "Australian Private Day Surgery X". Australian Private Day Surgery X has previously reported that the amount of revenue for the hospital per operating list generated by the least profitable paediatric dentist is not much different from the amount generated by the most profitable, so there are really no outliers skewing the results.





Table 1. Average income per operating list (\$) for Australian Private Day Surgery X

|                                     | 2011 | 2012/2013 | 2013/2014 |
|-------------------------------------|------|-----------|-----------|
| Paediatric Dentistry                | 2466 | 2422      | 2565      |
| General Dental                      | –    | 1770      | 1948      |
| Podiatric (by a podiatrist) Surgery | 3127 | –         | –         |
| Oral Maxillofacial Surgery          | 3431 | 3587      | 3431      |
| Plastic Surgery                     | 3760 | 3462      | 3556      |
| General Surgery                     | 4116 | 4936      | 5628      |
| ENT Surgery                         | 4288 | 4904      | 5137      |
| Ophthalmic Surgery                  | 6223 | 7998      | 7843      |

Table 2. Average income per operating list (\$) for Australian Private Day Surgery X

|                                     | 2011 | 2012/2013 | Change since 2011 (%) | 2013/2014 | Change since 2011 (%) |
|-------------------------------------|------|-----------|-----------------------|-----------|-----------------------|
| Paediatric Dentistry                | 2466 | 2422      | -1.78                 | 2565      | 4.01                  |
| General Dental                      | –    | 1770      | –                     | 1948      | –                     |
| Podiatric (by a podiatrist) Surgery | 3127 | –         | –                     | –         | –                     |
| Oral Maxillofacial Surgery          | 3431 | 3587      | 4.55                  | 3431      | 0.00                  |
| Plastic Surgery                     | 3760 | 3462      | -7.93                 | 3556      | -5.43                 |
| General Surgery                     | 4116 | 4936      | 19.92                 | 5628      | 36.73                 |
| ENT Surgery                         | 4288 | 4904      | 14.37                 | 5137      | 19.80                 |
| Ophthalmic Surgery                  | 6223 | 7998      | 28.52                 | 7843      | 26.03                 |

I will let the figures speak for themselves, however I would particularly like to draw your attention to:

- Ophthalmic Surgery generates more than 3 times the amount of income for the hospital per operating list than Paediatric Dentistry
- Ophthalmic Surgery generates more than twice the amount of income for the hospital per operating list than Oral and Maxillofacial Surgery
- The income generated for the hospital per operating list for General Surgery, ENT Surgery and for Ophthalmic Surgery has increased enormously between 2011 and 2013/14
- The income generated for the hospital per operating list for Paediatric Dentistry has only increased by a small amount between 2011 and 2013/14
- The income generated for the hospital per operating list for Oral and Maxillofacial Surgery has not increased between 2011 and 2013/14.

In summary:

- It is very difficult for dentists and dental specialists to compete with medical practitioners in relation to accessing operating lists in private hospitals because medical lists are more profitable for the hospitals.
- Over time (2011 - 2013/14), the gap between what the private hospitals can earn from a medical operating list and what they can earn from a dental operating list has widened. As a result, dentists and dental specialists are finding it increasingly difficult to get access to private hospital operating theatres for the dental and oral surgical care of their patients.

Yours sincerely,

John M Sheahan  
Federal President  
ANZSPD Inc.



# ANZSPD Secretary / Manager's Report

Peter Gregory

Greetings From Western Australia.

I am pleased to submit my final report as Secretary/Manager to Synopses for publication. As most of you know, I took over the role when asked by Federal Council, following the sudden and untimely passing of our much loved and respected former Secretary/Manager, Dr Alistair Devlin, in March 2013. I will be handing over the reins at the end of the Adelaide Biennial in November. In fact, this may be the last report by a Secretary / Manager of ANZSPD as there is a proposed constitutional change that the position be split into separate Secretary and Treasurer positions at the forthcoming AGM.

## 1. New Member of Federal Council.

In March this year we welcomed Dr Heather Anderson to her first Federal Council meeting. Heather is the new Councillor representing New Zealand and we are certain that she will represent her branch admirably. We would like to thank her predecessor, Dr Erin Mahoney, for the great contribution she has made in so many ways to our Society over the past few years.

## 2. New Editor of Synopses.

We also welcome Dr Steve Kazoullis (also ANZSPD Queensland Branch President) to the position of Editor of Synopses. We hope that all members will assist Steve in his endeavours to produce a quality magazine by contributing material for publication. We also acknowledge the great work that the outgoing Editor, Dr Tim Johnston, has done over the years. The task of any Editor is always challenging in sourcing enough material for inclusion from the members, and hopefully the new protocol introduced by Council for the Editor to allocate each issue to a branch, will expedite the process.

## 3. ANZSPD Federal Council Meeting, Brisbane, March 2015.

A Federal Council meeting was held at the Rydges Hotel, Brisbane on 28th

March 2015. All Federal Councillors and the Secretary / Manager were present.

**a) Website.** Dr John Winters gave a presentation and update on the status of the new ANZSPD website. The launch of the website had occurred in December 2014, but there were still some minor hiccups which needed addressing. Overall, the system seemed to be working well, particularly with the collection of subscriptions. Council was asked by Dr Winters to nominate two members to a sub-committee of ANZSPD and AAPD representatives to oversee the content of both websites. I would like to acknowledge the great contribution that John Winters has made in bringing this formidable task to where it is now. There have been exceptional hurdles, which have had to be overcome, but we are so fortunate to have had John in the driving seat. Thank you John.

**b) ANZSPD Biennial Meeting.** It was resolved by Council that the next Biennial meeting of the Society, following the November 2015 meeting in Adelaide, will be held in Brisbane, Queensland.

**c) RK Hall Lecture Series.** It was resolved by Council that the next RK Hall Lecture Series would once again only be held in one location and to be in New Zealand.

**d) Celia Lashlie Foundation.** We were saddened to hear of the passing of Celia Lashlie. Celia was a Keynote Speaker at our last NZ Biennial meeting in Queenstown, New Zealand and also has been a guest speaker at NZ and NSW branch meetings. A foundation has been sent up in her name, and it was resolved by Council to make a donation to this most worthwhile cause.

## 4. Next ANZSPD Biennial Meeting.

Dr Michael Malandris and Associate Professor Sam Gue and their energetic and hard working team are busy planning what will be an excellent scientific and social event in Adelaide, SA from 12-15 November 2015. We look forward to these events with great anticipation.

Please mark your diaries and go to the website for further information  
<[info@themeetingpeople.com.au](mailto:info@themeetingpeople.com.au)>

## 5. Federal Council Meeting.

The next Federal Council Meeting of the Society will be held in Adelaide on 11 November 2015, just prior to the commencement of the ANZSPD Biennial meeting.

## 6. Constitutional Changes.

The Federal ANZSPD (Inc.) Constitution has not been overhauled for several years. It may not even now comply with the WA Regulatory Authorities. It is planned that a re-vamped Constitution will be ready for voting at the next AGM in Adelaide in November 2015. If you have any issues with the current FEDERAL ANZSPD (Inc.) Constitution and wish to propose changes, please forward them to me in the form of a motion, duly seconded, so they can be appropriately circulated prior to the meeting.

## 7. Resignation.

As most of you know, I was asked by the Federal Council in April 2013, to assist in an interim capacity to take over the duties of our much loved and greatly esteemed former Secretary/Manager, Dr Alistair Devlin, following his untimely and sudden passing. It is now time that a younger and more permanent replacement is found, so I have tendered my resignation, effective November 2015 at the end of the Adelaide Biennial Conference. In order to lighten the load, it is envisaged that the position of Secretary/Manager will be split into two positions – Secretary and Treasurer.

## 8. New Agreement with Colgate Oral Care

I am pleased to inform you that negotiations to renew our agreement with Colgate Oral Care have been completed

CONTINUED FROM PAGE 9...

following the expiration of the last five year agreement on June 30 this year. We await final signing of the agreement by all parties, which should occur in the near future. The renewal is for a further five years with little change to the Terms and Conditions of the last agreement, which has worked so well for our society. We are indebted to Dr Susan Cartwright and her wonderful team at Colgate Oral Care for their continuing support in what continues to be trying financial times for most organisations.

#### 9. UWA Dental Foundation Alistair Devlin Memorial Scholarship.

Many of our members donated to this scholarship, which was established to acknowledge Dr Alistair Devlin's significant contribution to the teaching of Paediatric Dentistry at the University of WA. I have been informed that the target amount was reached and the first award has been made to the most outstanding Graduate Student in Paediatric Dentistry at UWA. The prize was to allow a graduate student in Paediatric Dentistry to spend some time during his/her course at a centre of excellence in Paediatric Dentistry. The first recipient of the Scholarship was Dr Rodney Jennings, who was able to spend a period earlier this year at the Hospital for Sick Children, Toronto, Canada.

#### 10. Acknowledgements.

I wish to again acknowledge the role of the Federal President, Dr John Sheahan, who has led our organisation so admirably over the last three and a half years (a record), and who will be standing down in November from the position. He will now take up the role of Immediate Past President for the next term of office of the society. It is over 30 years since I was President and I can see just how much additional work and effort is required these days. I would also like to thank the Federal Councillors, Branch Executive and the members of our organisation for their continuing support. Special thanks must go to Dr Susan Cartwright and her wonderful team at Colgate Oral Care for their never-ending support and sponsorship.

Best wishes and good health to all.

*Peter Gregory*  
Secretary / Manager  
ANZSPD (Inc.)

## Remote, community based, oral health care and education – The Kimberley Dental Team

*Dr Jilen Patel*  
Senior Dental Officer & Director Kimberley Dental Team

The Kimberley is one of the world's most unique wildernesses stretching over 400,000 square kilometres across the north of Western Australia. The region's natural beauty is renowned for its rugged and diverse landscape ranging from spectacular gorges and mountains to endless desert plains and isolated coastal sections. The Kimberley's biodiversity is complemented by the region's rich Aboriginal culture, traditions and customs. It is home to over 100 Aboriginal communities of varying sizes and has an estimated population of 40,000, approximately 50% of whom identify as being of Aboriginal or Torres Strait Islander descent<sup>1</sup>.

Aboriginal Australians experience poorer periodontal health, higher caries experience with greater levels of untreated caries and missing teeth than non-Aboriginal Australians<sup>2,3</sup>. In addition, inequalities in the determinants of health such as socio-economic status, education, cultural and environmental factors have all been shown to have a significant influence on current patterns of oral health and disease in Aboriginal communities<sup>2</sup>. Access to healthcare and more specifically dental care is particularly limited in rural and remote regions of Western Australia. The delivery of dental services and dental health education to the many sparsely populated remote communities in the Kimberley presents a unique challenge. Furthermore, the low population densities combined with the high running costs and staffing of a dental practice means that establishing a permanent dental workforce and full time services to remote communities is unviable and difficult to sustain<sup>4</sup>. To date disparities in oral health continue to persist in the Kimberley with previous studies in the area underlining the urgent need to develop alternative strategies targeting oral health<sup>2</sup>. Using volunteers to complement the existing infrastructure and extend dental care to remote communities is one such strategy.

The Kimberley Dental Team (KDT) was formed in 2009 following requests from the local community and in response to unmet need for dental care in remote Kimberley

communities. Dr John Owen AM and his wife Mrs Jan Owen founded the KDT following a visit to Halls Creek in 2009; the local school welcomed their dental background given that many children were suffering from dental decay and pain and access to dental care was particularly limited. Initially the Owens discovered that over 40% of the primary school children screened in the East Kimberley required urgent dental care and that 75% had widespread tooth decay requiring urgent dental treatment or treatment within six months<sup>5,6</sup>. The following year the couple returned with a small group of volunteers and dental supplies to provide much needed emergency treatment and oral health education<sup>7</sup>. Since 2009 KDT has grown to involve more than 300 volunteers including dentists, dental specialists, allied health professionals and administrative and liaison personnel from across Australia.

Volunteering with KDT is an annual event where rotating teams of volunteers spend a week each in the Kimberley over three four-week periods each year. In an effort to foster graduates with a greater sense of cultural awareness and clinical experience, KDT also works in partnership with the University of Western Australia such that dental students are able to volunteer with KDT under supervision. The success of the KDT model of care has allowed its translation into metropolitan Perth with the model being applied in areas such as homelessness, residential aged care and disadvantaged youth.

As the KDT program developed advancements were made both in terms of equipment and the model of care. The design, implementation and use of mobile dental units to extend services into isolated Aboriginal communities is particularly relevant. KDT has adapted a range of mobile units to better suit the needs of different communities. For example the recently designed KDT community service vehicle allows for the implementation of dental services directly within schools, nursing posts and other community centres (*Figure 1*).



Alternatively, the KAMSC mobile dental truck and McKusker Dental trailer

provide a fully equipped dental surgeries as well as accommodation allowing volunteers to work in remote communities for extended periods of time (*Figure 2*).

Trips are typically structured using a hub and spoke approach where a larger community is used as a base and volunteers may then travel to further outlying communities. With the advent of portable dental systems and accommodation units trips can also be structured such that volunteers commence their journey in the West Kimberley (eg Broome) and provide services to communities en route to finishing their journey in the East Kimberley (eg Halls Creek) and vice versa. Evidently travelling to and setting up in different communities can be arduous and requires considerable planning such that the time spent in each community is worthwhile.

Key elements of the KDT model include culturally appropriate and flexible dental health services, continuing oral health education and promotion, dental health advocacy and organisational sustainability.

Over the last four years KDT has worked together with The Health Schools Program to deliver the “Strong Teeth for Kimberley Kids” daily school tooth-brushing program (*Figure 4*). The cost of a toothbrush in some remote communities can be as high as \$7 AUD and as a result access to adequate oral hygiene materials can be limited for many families. It was not uncommon for children in some communities to have never owned a toothbrush let alone use a toothbrush as part of their daily routine. Through the “Strong Teeth for Kimberley Kids” program, KDT has distributed over 150,000 toothbrushes as well as toothpaste and oral health education material to schools across the Kimberley. This program reaches an estimated 4000 school children each year. The program encourages school children to brush their teeth at school with the support and supervision of staff members (*Figure 3*). Each child receives a new oral hygiene kit every term and staff members also receive appropriate dental health education material allowing for oral health messages to be incorporated within the curriculum. This program has been hugely successful and has been well received by the children, schools and the wider community. The “Strong Teeth for Kimberley Kids” program underpinned by similar oral health promotion activities forms the backbone of KDT’s work in the Kimberley.



Every two years the KDT endeavours to screen and triage all school children in the 20 or so communities the team visits. Upwards of 500 children may be screened during such a visit (Figure 5). This process is essential in providing school based oral health promotion, establishing preventive strategies, conducting dental triage and also allows for the KDT program to be continually evaluated. This is a mammoth operation involving volunteer management, coordination with schools, meticulous record keeping and not mentioning the complex logistics behind gaining informed consent for any treatment required! Treatment plans are formulated for each child and appropriate treatment modalities are arranged. These may be through KDT directly, the school dental service, government dental clinic, private dental clinics or in some cases hospital and specialist referrals are required due to the extent and severity of the dental disease.

Fissure sealants and topical fluoride applications are also performed for school children as required following appropriate consent. Such preventive measures when combined with the daily toothbrushing program have shown great promise in reducing the dental disease burden among these children. Over the years there has been a steady decline in the need for oral surgical procedures and a reduction in the need for emergency treatment in the communities KDT has been regularly visiting. More importantly a gradual change in oral health behaviour and oral health literacy has been observed in these communities. Where once pain seemed to be the main reason for presentation, many parents now bring their children for 'check ups' and 'polishing' regardless of symptoms. Although there is still considerable need to improve oral health literacy among remote Aboriginal communities such developments are promising given the extent to which other psychosocial determinants impact on oral health. As suggested by Wood and colleagues (2008) basic concerns such as personal safety and having enough money to provide food and housing may take precedence over long term health issues such as oral hygiene in Aboriginal communities<sup>7</sup>.

The need to integrate with primary health care services, provide culturally appropriate oral health promotion and engage with communities spreading across vast distances, justifies the need for a team approach over the traditional dentist-

nurse model. A multi-disciplinary, dental team approach addressing common health risk factors such as nutrition and chronic diseases such as diabetes may be more appropriate in addressing the existing oral health inequalities<sup>8</sup>. This is consistent with the approach used by the KDT in providing care to the remote Aboriginal communities.

It is important to note that many volunteer dental programs stem from well meaning intentions which are often based on altruistic ideals shared by volunteers, structured around a charitable model of care<sup>9,10</sup>. These programs typically involve volunteers working in vulnerable communities focusing on providing acute care for individuals with little regard for the oral health of the community as a whole or the residual effects that volunteer efforts may have on local health infrastructure<sup>9,10</sup>. This concept of 'voluntourism' and 'aid' can have unintended consequences and can be more disabling than enabling for a vulnerable community, particularly if primary public health principles are not considered<sup>10</sup>. The Basic Package of Oral Care was developed by the World Health Organization and is adapted by KDT to address many of these shortcomings<sup>11</sup>. Additionally a strong emphasis is placed on oral health promotion and integration with primary health care services. KDT also employs a dedicated Aboriginal liaison officer who facilitates dental health promotion and advocacy within the Kimberley communities, which is of particular importance in the absence of the team. This collaborative multifaceted approach allows for a more predictable and sustainable outcome in the provision of dental care to remote Aboriginal communities.

The work that KDT has done over the last six years has been influential in extending dental care to remote Aboriginal communities. The KDT program has provided over \$1 million AUD of free dental treatment to vulnerable communities across Western Australia and continues to provide much needed dental services and oral health education to these areas. Besides from the direct care provided, the program has more importantly increased the awareness of the significant and persisting disparities in oral health faced by Aboriginal communities in the Kimberley. Although volunteer organisations such as KDT play an important role in service provision, they underline the need for systemic changes in dental public health policy and practice.

Improving oral health outcomes in the Kimberley is complex and twofold. Firstly, the intricate socio-cultural factors that impact on oral health of Aboriginal people need to be understood and addressed and secondly a flexible, culturally appropriate and sustainable model of dental care is required to address the needs of remote communities.

**"Strong Teeth",  
"Strong Body", "Strong Mind"**

*Kimberley Dental Team*

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## Victoria Branch Report

*Dr Amy Fung*

The ANZSPD Victorian branch has had a busy year in 2015. Our first scientific meeting, the Des Crack presentation and lecture meeting, was held on the 28th of February at the Royal Children's Hospital. Our speakers, Professor Hanny Calache and Clinical Associate Professor Kerrod Hallett updated registrants with current ideas and trends on Caries Risk Assessment and Minimal Intervention Dentistry.

Our second scientific meeting held on the 29th of August at the Royal Children's Hospital was our Elsdon Storey Memorial Lecture. The theme for this meeting was "Helping children through music play and beyond". Lead by Dr Tony Bajurnow and Clinical Associate Professor James Lucas, it was well supported by play and speech therapists, Ms Beth Dun and Anne-Marie Leahy. They covered a range of pharmacological and non pharmacological behavioural management hints and tips for clinical practice. Additionally, dietitian Ms Zoe Nicholson addressed the effects of common food intolerances in children and the potential nutritional effects associated with them.

The ANZSPD Victorian Branch would also like to acknowledge the dedication and contribution by our outgoing committee members, Drs John Sheahan and Karen Kan. Both John and Karen have been long standing members of the committee and held many executive roles within the Victorian Branch. Their advice, mentoring, support and knowledge will be sorely missed by our ongoing executive committee.

In 2016, the ANZSPD Victorian Branch have planned to include two dinner meetings in March and July, with our Elsdon Story Memorial Lecture and AGM to be held in October. We are looking to include a variety of dental and medical topics that will appeal to our members and friends attending.

## New Zealand Branch Report

*Alison Meldrum*

It is with sadness that the NZ branch acknowledges the passing of Dr Grace Suckling on 20th July, 2015 in Waikanae, New Zealand. The branch is privileged to be the recipient of her generosity for she has donated to us a copy of her vast historical slide collection. This valuable resource on enamel developmental defects is available to branch members and is a permanent record of Grace's contribution and achievements. Grace's humble response to her achievements is summarised: "I have enjoyed looking again at my historical slides and thank you for making it possible to get them updated. I wish the Society continued success." More than her slide collection, she leaves us a wonderful example of professionalism – defined by graciousness, modesty and humility. She will be missed.

As the ANZSPD Biennial 25th congress is being held in Adelaide in November 2015 it was agreed that the NZ branch study day would be deferred to February 2016 and the venue would be moved. The destination of this meeting is New Zealand's first dental school, now the University of Otago Staff Club, Dunedin. The NZ branch is also hosting the 2016 RK Hall Seminar. This has been scheduled for 26th November 2016 in or near Auckland. Please note these dates. Details of the study day and RK Hall seminar will be circulated as soon as they have been finalised.

Best wishes to the Adelaide congress committee for a successful event. Both venue and programme herald an enjoyable event.

Compliments to all for the upcoming festive season.

## Queensland Branch Report

*Greg Ooi*

*Secretary/Treasurer*

**ANNUAL CLINIC DAY  
SATURDAY 12TH DECEMBER 2015**

On behalf of ANZSPD Queensland Branch, we wish to extend a very warm welcome to members and friends to attend our Annual Clinic Day on Saturday in December.

We have three speakers for the day, who will present on topical relevant issues in the world of Paediatric Dentistry.

### **SPEAKERS**

- Emeritus Professor Kim Seow
- Dr Geraldine Moses
- Dr Antonije Cakar

### **TOPICS**

- Update on paedodontics
- Pharmacology
- Presentation of research findings on prevention of childhood caries

### **VENUE**

The picturesque grounds of the Victoria Park Golf and Function Centre in Herston, two kilometres from Brisbane CBD.

We look forward to welcoming you to participate in a fantastic day of learning followed by an evening of food and festivities.

Out of towners may wish to make a weekend of it and catch up with friends and colleagues as the festive season nears.

For more information, please contact Dr Greg Ooi or Dr Steven Kazoullis on the contact details on the back of this Synopses issue.

We sincerely hope to see you there!





# Facial cellulitis arising from a supernumerary tooth with dens invaginatus

Yvonne Lai, Robert Anthonappa, Nigel King

*Paediatric Dentistry, School of Dentistry, University of Western Australia*

## Introduction

Supernumerary teeth are defined as “any tooth or odontogenic structure that is formed from a tooth germ in excess of the usual number for any given region of the dental arch” (Omer et al. 2010). They may be single or multiple, unilateral or bilateral in distribution, and can occur in either arches of the primary, mixed or permanent dentitions (Anthonappa et al. 2008). The majority of supernumerary teeth occur in the pre-maxilla, with an inverted orientation; this is the reason why they remain unerupted (Anthonappa et al. 2008). The reported prevalence of supernumerary teeth in the general population is possibly higher than that reported in the literature and probably ranges from approximately 3% to 6%, or even higher with a gender predilection for males (Anthonappa et al. 2013). Supernumerary teeth are commonly classified according to their morphology and location. Morphological classification includes conical, tuberculate, supplemental, and odontoma types, while in accordance with their location they are grouped as mesiodens, para-premolars, paramolars, and distomolars (Bolk, 1914; Scheiner and Sampson, 1997). The term supplemental tooth was first used by Glassington in 1893 to describe a supernumerary tooth that was of a similar morphology to the normal tooth series.

Most individuals are unaware of the presence of supernumerary teeth unless they develop complications, such as: crowding of the teeth; noneruption or delayed eruption of the adjacent teeth; displacements; midline diastemas; delayed exfoliation of primary teeth; pathological cyst formation; paresthesia and/or pain due to impingement of a supernumerary tooth on an adjacent nerve; ectopic eruption in the nose or maxillary sinus; and aesthetic compromises (Garvey et al. 1999; Proff et al. 2006; Sanei-Moghaddam et al., 2009) subsequently leading to their identification. Therefore, both clinical and radiographic assessments are essential for the identification of the supernumerary teeth and for the determination of the exact location (Anthonappa et al. 2012).

The term “dens invaginatus” was introduced by Hallet in 1953 and is the preferred term to describe this anomaly; although “dens in dente”, is still often used. Dens invaginatus is defined as “an epithelial invagination that originates in the crown of the developing tooth” (Oehlers 1957), and its prevalence varies between 0.25% and 10% in different studies (Ridell et al 2001). This variation is probably due to geographical differences and variations in diagnostic criteria and/or investigation methods. Although concomitant occurrence of dental anomalies such as, supernumerary teeth and dens invaginatus is of a rare occurrence one should beware of the potential consequences. This report describes the management of 15 year old boy who presented to the emergency department with concurrent pain from his anterior teeth and a facial cellulitis.

## Clinical report

A 15-year-old boy was referred from a general dental practitioner (GDP) to the after-hours Emergency Department (ED) of a major children's hospital. The patient presented with a facial swelling on the right hand side which had commenced 12 hours prior to the presentation to the ED. The patient had experienced toothache for over a week with associated headaches and pain in his jaws. His medical history was unremarkable. A GDP had informed the patient of the two supernumerary teeth (12s and 22s) in the anterior region of the maxilla during one of his visits and had suggested monitoring them as they were asymptomatic and unerupted. The patient reported that these supernumerary teeth had erupted approximately 12 months ago and were palatal to teeth 11 and 21.

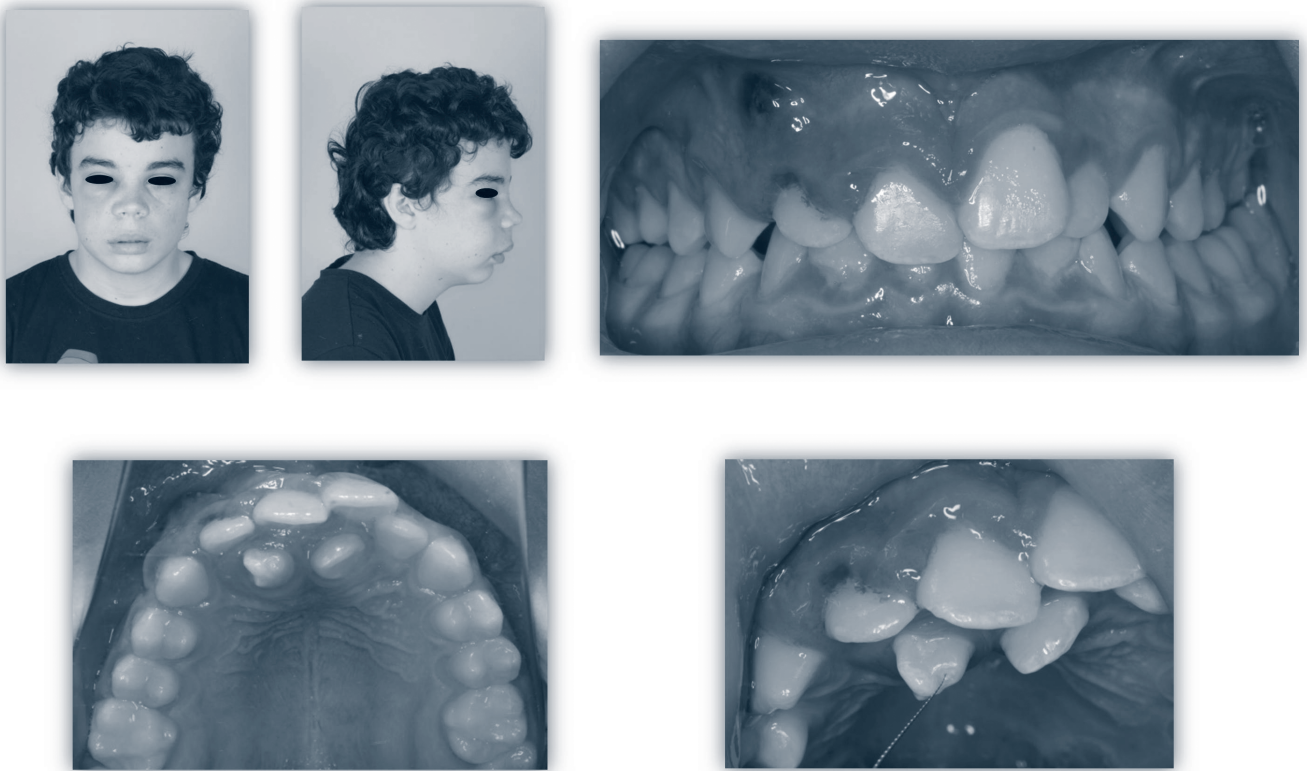
Extra-oral examination revealed a facial swelling on the right hand side extending over the infra-orbital and the zygomatico-facial region with associated tenderness to palpation (*Figure 1*). Intra-orally the patient exhibited a permanent dentition with two erupted supernumerary teeth (12s and 22s) in anterior region of the maxilla palatal to teeth 11 and 21. The supernumerary tooth 12s was of the

tuberculate type with an indentation evident on the mesio-incisal region while the supernumerary tooth 22s was of the supplemental type. Teeth 11, 12, and 12s were all tender to percussion and a non-draining abscess was evident on the buccal aspect of tooth 11 (*Figure 1*).

The panoramic radiograph, provided from the referring dentist (*Figure 2a*), confirmed the clinical findings. Although there was an evidence of periapical radiolucency in relation to teeth 11, and 12s, this was unconvincing, due to the superimposition of the structures and the narrow focal trough. Furthermore, a maxillary occlusal and periapical radiographs (*Figure 2b*) illustrated the widening of the periodontal ligament space in relation to teeth 11 and 12s; and diffuse radiolucency in the apical region of teeth 11 and 12s.

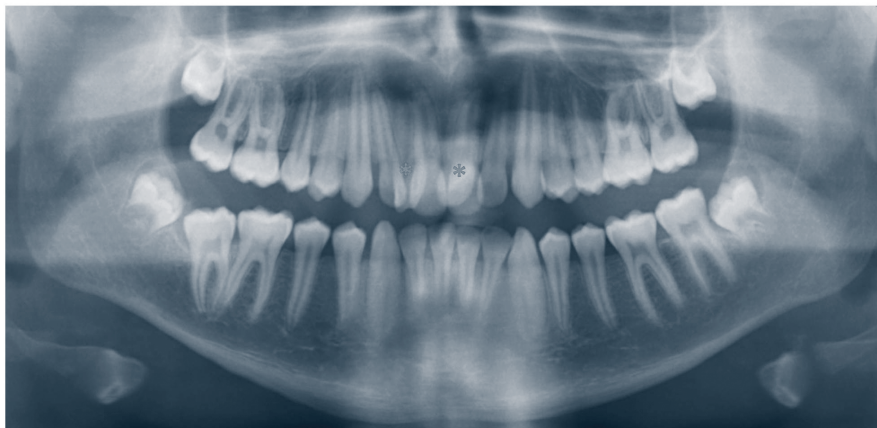
The patient was hospitalised, intravenous antibiotics administered, and re-examined the following day. Extra-orally, the right facial swelling was noted to have increased in size and electric pulp-testing demonstrated positive responses from teeth 11, 12 and 21, and no response from tooth 12s. An initial attempt to negotiate the incisal pit on tooth 12s with a Size 8 Hedstrom file was unsuccessful; nevertheless, on subsequent attempts patency on tooth 12s was established. Furthermore, a periapical film with a gutta percha point inserted into the draining sinus was of little diagnostic value as the gutta percha point tracked past the apices of the teeth. In addition, CO<sub>2</sub> was used to freeze and lance the abscess on the buccal aspect of tooth 12, and drainage was established with direct pressure.

Tooth 12s was extracted under local anaesthesia and the patient was continued on intravenous antibiotics in the ward and analgesia for pain relief, and was then discharged after twenty-four hours with oral antibiotics. Post-operative review revealed complete soft tissue healing in the extraction site of tooth 12s. tooth 22s was subsequently extracted under local and relative analgesia six weeks later.

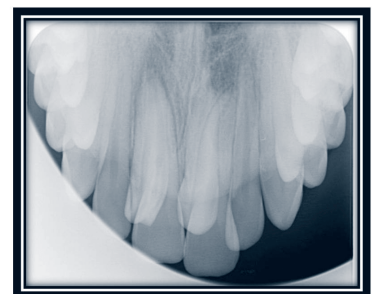
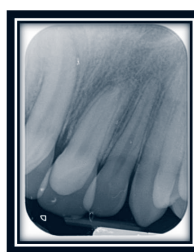


**Figure 1.** Extra-oral and Intra-oral pictures of a 15 year old boy who presented to the emergency department complaining of concurrent pain from his anterior teeth and a facial cellulitis. Note the facial swelling on the right hand side extending over the infra-orbital and the zygomatico-facial region, and the presence of two erupted supernumerary teeth, one with an associated dens invaginatus.

**Figure 2**



**a) Panoramic radiograph of a 15 year old boy who exhibits the presence of two supernumerary teeth (\*)**



**b) Periapical radiographs and a Maxillary anterior occlusal radiograph illustrated the widening of the periodontal ligament space in relation to teeth 11 and 12s; and diffuse radiolucency in the apical region of teeth 11 and 12s.**

## Discussion

This, to our knowledge, is the first report of facial cellulitis arising from a supernumerary tooth as a search, in the English language literature, for case reports of facial cellulitis arising from a supernumerary tooth / supernumerary tooth associated with dens invaginatus yielded no results.

Concomitant occurrence of dental anomalies is of rare occurrence. A literature search for supernumerary teeth with dens invaginatus resulted in 21 reported cases, with males more commonly affected than females (*Table 1*). The age at the time of diagnosis ranged from 7

years and 6 months to 52 years. Majority of these cases exhibited a supernumerary tooth in the anterior region of the maxilla, with the supplemental central incisor being the most commonly affected tooth type. Nevertheless, there were reports of bilateral supernumerary teeth associated with dens invaginatus, triple dens invaginatus in a supernumerary tooth, double dens invaginatus in a supernumerary tooth, and dens invaginatus in a mesiodens.

Supplemental supernumerary teeth are also of a rare occurrence and a literature search yielded 34 reports, the details of which are listed in *Table 2*. The age at the time of diagnosis ranged from four years to 20 years, and approximately 50% of these

cases reported unilateral supplemental incisors while the remaining 50% were bilateral supplemental incisors. Males were more commonly affected than females with the majority of the supernumerary teeth occurring in the permanent dentition (n=28), while three cases reported an occurrence in the primary dentition and three in both dentitions.

To date, only two reports of facial cellulitis arising from a tooth (belonging to a normal complement) with dens invaginatus have been published (*Table 3*). The management of dens invaginatus ranges from the application of fissure sealant to a conservative restoration of the opening, to endodontic treatment or even extraction of the tooth.

Table 1 Summary of reported cases of supernumerary teeth with dens invaginatus in the literature

| Author                     | Year       | Age   | Country       | Gender        | Ethnicity     | Description   | Site               | Age of Diagnosis |
|----------------------------|------------|-------|---------------|---------------|---------------|---|--------------------|------------------|
| Archer & Silverman         | 1950       | 9     | not specified | not specified | not specified | bilateral double dens invaginatus                               | 11s, 21s           | 9                |
| Rushton                    | 1958       | 7y 6m | not specified | M             | not specified | single dens invaginatus   | 21s                | 7y 6m            |
| Rushton                    | 1958       | 8     | not specified | F             | not specified | mesiodens with single dens invaginatus                          | maxillary anterior | 8                |
| Visser & Thoder van Velzen | 1972       | 18    | not specified | M             | not specified | two mesiodens with dens invaginatus                             | maxillary anterior | 18               |
| Conklin                    | 1975       | 12    | not specified | M             | not specified | bilateral double dens invaginatus                               | 12s, 22s           | 12               |
| Conklin                    | 1975       | 8     | not specified | M             | not specified | bilateral double dens invaginatus                               | 11s, 21s           | 8                |
| Mader                      | 1977       | 21    | not specified | M             | not specified | triple dens invaginatus   | 21s PE             | 21               |
| Shifmann & Tamir           | 1979       | 21    | Israel        | M             | Caucasian     | dens invaginatus 12 with concrescence with supernumerary 12s    | 12s                | 21               |
| Beynon                     | 1982       | 7y 6m | UK            | M             | not specified | mesiodens and dens invaginatus                                  | maxillary anterior | 7y 6m            |
| Serrano                    | 1991       | 17    | America       | F             | not specified | triple dens invaginatus in mesiodens, 12, 22                    | maxillary anterior | 17               |
| Mehta                      | 1992       | 23    | not specified | M             | not specified | bilateral dens invaginatus palatal impaction 11s (UE), 21s (PE) | 11s, 21s           | 23               |
| Morfis                     | 1992       | 11    | Greece        | F             | not specified | bilateral dens invaginatus 12s, 22s                             | 12s, 22s           | 11               |
| Noikura & Kikuchi          | 1996       | 13    | Brazil        | M             | Caucasian     | bilateral dens invaginatus                                      | 11s, 21s           | 13               |
| Jimenez-Rubio              | 1997       | 52    | Spain         | M             | Caucasian     | dens invaginatus Oehlers Type I, Hallett Type 3.                | 11s                | 52               |
| Holtzman                   | 1998       | 24    | Israel        | M             | not specified | Oehlers Type II dens invaginatus                                | 11s                | 24               |
| Sousa Neto et al.          | 1998       | 32    | Brazil        | M             | not specified | bilateral dens invaginatus 11s, 21s                             | 11s, 21s           | 32               |
| Panetta et al.             | 2005       | 11    | not specified | M             | not specified | double dens invaginatus (coronal)                               | 11s                | 11               |
| Sannomiya et al.           | 2007       | 8     | Brazil        | F             | not specified | dens invaginatus in mesiodens                                   | 21s                | 8                |
| Sannomiya et al.           | 2007       | 16    | Brazil        | M             | not specified | bilateral supernumerary with dens invaginatus                   | 11s, 21s           | 16               |
| Anegundi et al.            | 2008       | 14    | India         | M             | India         | double dens invaginatus (coronal)                               | maxillary anterior | 14               |
| Chen et al.                | 1986, 1990 | 21    | China         | F             | Chinese       | single coronal dens invaginatus                                 | 38 region          | 21               |

UE = unerupted PE = partially erupted



Table 2 Summary of reported cases of supplemental incisors in the literature

| Author                | Year | Age   | Country       | Gender | Ethnicity     | Side       | Dentition Set                   | Site                                      | Age of Diagnosis |
|-----------------------|------|-------|---------------|--------|---------------|------------|---------------------------------|---|------------------|
| Townend               | 1953 | 7     | UK            | M      | not specified | unilateral | primary and permanent           | 52s,12s                                   | 7                |
| Townend               | 1953 | 9     | UK            | M      | not specified | unilateral | primary and permanent           | 52s,12s                                   | 9                |
| Brown                 | 1954 | 7y8m  | England       | F      | not specified | bilateral  | primary, permanent (unilateral) | 52s,62s, 12s                              | 7y8m             |
| Munro                 | 1954 | 2y11m | Scotland      | M      | not specified | bilateral  | primary, permanent (unilateral) | 52s, 62s,12s                              | 2y11m            |
| Hutchinson            | 1956 | 9y2m  | UK            | M      | not specified | unilateral | permanent                       | 11s                                       | 9y2m             |
| Poutlon and Pruzansky | 1958 | 11    | UK            | M      | Negro         | bilateral  | permanent                       | 11s,12s                                   | 11               |
| Robertson             | 1962 | 7     | not specified | F      | not specified | bilateral  | primary and permanent           | 72s,82s, 32s,42s                          | 7                |
| Robertson             | 1962 | 6y5m  | UK            | M      | not specified | unilateral | primary and permanent           | 62s,22s                                   | 1y3m             |
| Boozer                | 1972 | 15    | not specified | M      | Caucasian     | unilateral | permanent                       | MX central incisor                        | 14               |
| Taylor                | 1979 | 11    | Canada        | F      | Caucasian     | unilateral | permanent                       | 12s                                       | 11               |
| Rock                  | 1991 | 9y6m  | not specified | M      | not specified | bilateral  | permanent                       | 11s,21s                                   | 9y6m             |
| Steelman              | 1991 | 10    | US            | M      | Caucasian     | bilateral  | permanent                       | 11s,21s                                   | 10               |
| Dowling               | 1997 | 10y2m | Ireland       | M      | Caucasian     | bilateral  | permanent                       | MX lateral incisor                        | 10               |
| Tomizawa              | 2002 | 8y6m  | Japan         | M      | Japanese      | bilateral  | primary                         | 51s,61s                                   | 8y6m             |
| Camilleri             | 2003 | 13    | not specified | M      | not specified | bilateral  | permanent                       | MX central incisors                       | 13               |
| Melnik                | 1993 | 9     | not specified | M      | Caucasian     | unilateral | permanent                       | MX right central incisor                  | 9                |
| Tiku et al.           | 2004 | 9y7m  | not specified | M      | not specified | unilateral | permanent                       | 22s                                       | 9y7m             |
| Cho                   | 2005 | 8     | not specified | F      | not specified | bilateral  | permanent                       | 2 supplemental MN incisors                | 8                |
| Roberts et al.        | 2005 | 22m   | UK            | M      | Caucasian     | bilateral  | permanent                       | 53s,51s,63s                               | 22m              |
| Bhat                  | 2006 | 13    | not specified | M      | not specified | unilateral | permanent                       | I MN central incisor                      | 13               |
| Schulz-Weidner et al. | 2007 | 4     | Germany       | M      | Thai          | bilateral  | primary                         | MX central incisors-triplication          | 4                |
| Sivapathasundha       | 2007 | 20    | India         | M      | not specified | bilateral  | permanent                       | 2 supplemental incisors between 11 and 22 | 20               |
| Srivatsan             | 2007 | 19    | India         | F      | Indian        | unilateral | permanent                       | 22s                                       | 19               |
| Ammari et al.         | 2008 | 9     | Scotland      | M      | Caucasian     | unilateral | permanent                       | 22s                                       | 9                |
| Lee at al.            | 2008 | 8y7m  | Hong Kong     | M      | Chinese       | unilateral | permanent                       | MN right lateral incisor                  | 8y7m             |
| Lee at al.            | 2008 | 7     | Hong Kong     | F      | Chinese       | unilateral | permanent                       | MX right lateral incisor                  | 7                |
| Lee at al.            | 2008 | 6     | Hong Kong     | F      | Chinese       | unilateral | permanent                       | MX right lateral incisor                  | 6                |
| Lo et al.             | 2008 | 10    | not specified | M      | not specified | bilateral  | permanent                       | MX lateral incisor                        | 10               |
| Gautam et al.         | 2011 | 16    | India         | M      | not specified | unilateral | permanent                       | MX right lateral incisor                  | 16               |
| Hans et al.           | 2011 | 18    | India         | M      | not specified | bilateral  | permanent                       | MX central lateral incisor                | 18               |
| Nuvvula et al.        | 2011 | 14    | India         | M      | Indian        | bilateral  | permanent                       | MX central lateral incisor                | 14               |
| Yildirim and Bayrak   | 2011 | 8     | not specified | M      | not specified | bilateral  | permanent and primary           | 11s,21s,51s,61s                           | 8                |
| Rallan et al.         | 2013 | 13    | India         | M      | not specified | unilateral | permanent                       | MX central lateral incisor                | 13               |
| Tangade et al.        | 2013 | 13    | India         | M      | Indian        | unilateral | permanent                       | 11s                                       | 13               |

MX = maxillary MN = mandibular

Table 3 Summary of reported cases of dens invaginatus with facial cellulitis in the literature

| Author       | Year       | Age | Country | Gender | Ethnicity    | Site | Other anomalies | Age of Diagnosis |
|--------------|------------|-----|---------|--------|--------------|------|-----------------|------------------|
| Rakes et al. | 1988       | 7   |         | M      | Caucasian    | 12   | microdont 22    | 7                |
| Arsenault    | 2010; 2011 | 10  |         | F      | no specified | 12   | UE 12           | 10               |

The thin enamel and inaccessibility of the orifice to cleansing increases the chance of pulpal involvement secondary to caries. In addition, thin canals may be present within the enamel of the dens invaginatus, which directly communicate with the pulp resulting in pulpitis and necrosis. Therefore, early detection followed by conservative management with composite resin and/or a fissure sealant can prevent future complications.

Supernumerary teeth may be found during a routine, clinical, or radiographic examination, and may not be responsible for any discernible adverse effects on adjacent teeth. In such cases, if no future orthodontic treatment is foreseen, it is reasonable to recommend that no immediate surgical intervention is essential. Conversely, supernumerary teeth may: compromise the esthetics; delay the eruption of adjacent teeth; induce crowding/malocclusion; cause dentigerous cyst formation; complicate alveolar bone grafting; compromise the sighting of implants; and impinge on nerves leading to paresthesia and/or pain. In these cases, removal of the supernumeraries is vital to resolve the complications and prevent further damage. Therefore, it is logical to suggest that early diagnosis and appropriate intervention of the supernumerary teeth can prevent future undesirable complications. Nevertheless, the optimum time for surgical removal of unerupted supernumerary teeth still remains controversial, with some authors recommending an early removal (Omer *et al.* 2010) while others anecdotally favouring a delayed removal.

In the present case, early diagnosis and appropriate intervention could have prevented the facial cellulitis and the need for emergency visit to the hospital. Nevertheless, this case highlights that concomitant dental anomalies can occur, and that the clinicians should perform a through evaluation of a dental anomaly to prevent or limit the severity of the potential consequences.

In conclusion, concomitant occurrence of supernumerary teeth with dens invaginatus in a single tooth is rare,

and a comprehensive clinical and radiographic examination followed by timely interventions can prevent the development of untoward complications.

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# THE GREAT WHITE BITE

## TACKLING THE FUTURE OF PAEDIATRIC DENTISTRY

### ANZSPD 2015

18th Biennial Congress  
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16**

**12 - 15 November 2015**

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**Early bird  
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# THE GREAT WHITE BITE

## TACKLING THE FUTURE OF PAEDIATRIC DENTISTRY



The programme is a diverse mix of renowned speakers from around the world brought together to create three days of collaboration and learning in all aspects of paediatric dentistry.

A great social programme will be on offer for you to network with colleagues and friends.

### TOPICS INCLUDE:

- Psychology and paediatric dentistry
- Molar incisor hypomineralisation
- Dental trauma
- Orthodontics
- Genetics
- Caries prevention
- Restorative options in paediatric dentistry
- Sedation for children
- Special needs children
- Pulp therapy
- The overall team approach to success in paediatric dentistry

### INVITED SPEAKERS INCLUDE:

- Professor Helen Rodd
- Professor Bernadette Drummond
- Professor David Manton
- Professor Geoffrey Heithersay
- Associate Professor Mithran Goonewardene
- Associate Professor Chris Barnett and many more

We look forward to you joining us in Adelaide.

## PROGRAM AT A GLANCE

| Thursday 12th November 2015 |   |           |  |
|-----------------------------|---|-----------|--|
| 1930                        | Welcome Reception   |           |  |
| Friday 13th November 2015   |   |           |  |
| 0700-0800                   | Registration desk opens   |           |  |
| 0800-0900                   | Opening Session   |           |  |
| 0900-1015                   | Plenary Lecture: Professor Helen Rodd                                       |           |  |
| 1015-1045                   | Morning tea   |           |  |
|                             | Concurrent Sessions   |           |  |
| 1045-1215                   | CONCURRENT STREAM 1<br><br>Dental Trauma in the Young Permanent Dentition   | 1045-1215 | CONCURRENT STREAM 2<br><br>The Team-based Approach to Successful Orthodontic Treatment |
| 1215-1315                   | Lunch   |           |  |
| 1315-1445                   | Orthodontics - The Burden of Truth  | 1315-1500 | The Keys – Team Work in Paediatric Dentistry   |
| 1445-1515                   | Afternoon tea   | 1500-1530 | Afternoon tea  |
| 1515-1730                   | Tools for Paediatric Dentistry: Sedation, Hypnosis and Behaviour Management | 1530-1730 | Challenges in Clinical Practice: Special Needs Children and Adolescents                |
| Saturday 14th November 2015 |   |           |  |
| 0900-1015                   | Plenary Lecture: Professor Helen Rodd                                       |           |  |
| 1015-1045                   | Morning tea   |           |  |
| 1045-1215                   | Molar Incisor Hypomineralisation: Where are we?                             |           |  |
| 1215-1300                   | Lunch   |           |  |
| 1300-1500                   | ANZSPD Postgraduate Research Competition                                    |           |  |
| 1500-1530                   | Afternoon tea   |           |  |
| 1530-1700                   | The 21st Century: DNA and Teeth   |           |  |
| 0730-0830                   | Federal Council Meeting   |           |  |
| 1900-2300                   | Congress Gala Dinner  |           |  |
| Sunday 15th November 2015   |   |           |  |
| 0900-1030                   | Unravelling the Puzzle of Caries Prevention                                 |           |  |
| 1030-1100                   | Morning tea   |           |  |
| 1100-1230                   | Restoring Primary Teeth: Evidence and Experience                            |           |  |
| 1230                        | Closing Ceremony  |           |  |

### REGISTRATION FEES:

\*ALL FEES ARE GST INCLUSIVE AND IN AUSTRALIAN DOLLARS

|   | EARLY FEE<br>Prior to 9 Oct | STANDARD FEE<br>From 10 Oct |
|---|-----------------------------|-----------------------------|
| Full Registration – Registered Dentist or Dental Specialist – ANZSPD Member                                       | \$1,100                     | \$1,250                     |
| Full Registration – Registered Dentist or Dental Specialist – Non Member  | \$1,250                     | \$1,400                     |
| Full Registration - Dental Therapist/Dental Hygienist/ Oral Health Therapist/Practice Manager/Dental Staff Member | \$750                       | \$890                       |
| Full Registration - Dental Postgraduate Student   | \$595                       | \$850                       |
| Full Registration - Dental Undergraduate Student  | \$545                       | \$795                       |
| Day Registration – Friday or Saturday (per day)   | \$450                       | \$660                       |
| Day Registration - Sunday (shorter day)   | \$300                       | \$510                       |

### Meeting secretariat:

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NZDA verifies, that based on the information provided to NZDA, this activity meets the Dental Council policy requirements for CPD. NZDA CPD verification does not imply promotion or endorsement of the contents of any course. Attendees need to use professional judgment to assess the validity and usefulness of techniques, materials or therapeutic products to their own practice.



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# Up Coming *Events*

12-15 November 2015

ANZSPD 18th Biennial Convention

Adelaide Convention Centre

Adelaide, SA

[www.anzspd2015.com.au](http://www.anzspd2015.com.au)

12 December 2015

ANZSPD QLD Clinic Day

Victoria Park Golf Complex,

Herston, QLD

[go.65@optusnet.com.au](mailto:go.65@optusnet.com.au)

26-28 May 2016

Paediatric Dentistry Association of Asia 10th Biennial Conference

Tokyo Dome Hotel

Tokyo, Japan

[www.pdaa2016.asia](http://www.pdaa2016.asia)

11-13 August 2016

19th World Congress on Dental Traumatology

Brisbane Convention and Exhibition Centre

Brisbane, Australia

[www.wcdt2016.com](http://www.wcdt2016.com)

26-29 October 2016

NZDA Conference 2016

TSB Arena

Wellington, New Zealand

[www.nzda2016.org.nz](http://www.nzda2016.org.nz)

8-11 February 2017

13th International Congress of Cleft Lip and Palate and Related Craniofacial Anomalies

Radisson Blu Resort

Chennai, Tamil Nadu, India.

17-21 May 2017

ADA 37th Australian Dental Congress

Melbourne, Australia

[www.facebook.com/adacongress](http://www.facebook.com/adacongress)

[cleft2017.org](http://cleft2017.org)

4-7 October 2017

IAPD 26th Congress

Santiago, Chile

[www.iapd2017.com](http://www.iapd2017.com)

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